

1. When a plane mirror placed behind a convex lens the combination behaves like which optical device? (1)
 2. When light goes from air to glass by what factor its wavelength and frequency changes? (1)
 3. A bulb is placed at the bottom of a tank 2 m deep. When the tank is filled with water of refractive index $\frac{4}{3}$, calculate the area of water surface illuminated by the bulb. (2)
 4. What do you mean by rms current? Derive the relationship between peak value and rms value of current in A.C. circuit. (2)
 5. A capacitor of capacitance $5.0\mu\text{F}$ is charged by a cell of emf of 40V. The charged capacitor is connected across an inductor of inductance 2.0mH. Write the equation for instantaneous charge on the capacitor and instantaneous current through the inductor. Write the instants at which total energy is purely magnetic. (2)
 6. Two polaroids A and B are placed normal to a light beam with their axis mutually perpendicular. What is the intensity of light received by the observer? Now if a third polaroid is inserted between them so that its axis makes 45° with both A and B. What is the intensity received by the observer in terms of intensity of polarised light? (2)
 7. Prove laws of refraction using Huygen's Principle. (2)
 8. Why central bright fringe of a diffraction pattern is brightest but brightness of secondary bright fringes keep decreasing? (2)
 9. Two slits of equal width are used in an interference formation by a monochromatic light. Establish a relation to show how resultant intensity varies with phase difference during superposition. Show graphically the variation of this intensity. (2)
 10. Show that when an object is placed in front of a convex mirror a virtual, erect, diminished image forms between its focus and optical centre. (2)
 11. Draw the path of light through a prism. Establish the prism equation and justify the shape of graph between angle of incidence and that of deviation. (3)
 12. Derive an expression for the impedance of an A.C circuit with a capacitor and resistor in series with the help of a neat phasor diagram. (3)
 13. An inductor of unknown inductance, a capacitor of $100\mu\text{F}$ and a resistor of resistance 10Ω are connected in series to 200V, 50Hz A.C source. It is found that the power of the circuit is unity. Calculate inductance of the inductor, current amplitude and Q factor. (3)
 14. State the working principle of a transformer, Explain the construction and working of a transformer and hence obtain the relation between the input and output voltages. (3)
 15. A point object is placed on the principal axis in front of a concave curved surface of refractive index μ_2 greater than surrounding refractive index μ_1 . Draw a neat ray diagram to show formation of its image. Hence derive curved surface formula. Distinguish between its first and second focal length. (1+3+1)
- (OR)
- Draw a neat ray diagram of compound microscope. Derive the formula of its magnifying power. Justify that both the lenses should be of small focal length. (2+2+1)